

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of creating a depth map including the steps of:
 assigning a depth to at least one pixel or portion of an image;
 determining relative location and image characteristics for each said at least one pixel or portion of said image;
 utilising said depth(s), image characteristics and respective relative location to determine a configuration of a first algorithm to ascertain depth characteristics as a function of relative location and image characteristics;
 utilising said first algorithm to calculate a depth characteristic for each pixel or portion of said image;
 wherein said depth characteristics form a depth map for said image.
2. A method as claimed in claim 1, wherein said image characteristics include RGB values.
3. A method as claimed in claim 1 further including the step of reassigning a depth to any pixel or portion of said image to correct for any inconsistencies.
4. A method as claimed in claim 1, wherein said image characteristics include at least one of luminance, chrominance, contrast or spatial measurements.
5. A method as claimed in claim 1, wherein said first algorithm may be represented by the equation:

$$z = f(x, y, R, G, B)$$
 where x and y define the relative location of a sample.
6. A method as claimed in claim 1, wherein a learning algorithm is utilised to determine the configuration of said first algorithm.
7. A method as claimed in claim 6, wherein for each pixel in the image, the learning algorithm computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot R_n + k_d \cdot G_n + k_e \cdot B_n$$

where

n is the n th pixel in the key-frame image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_a to k_g are constants and are determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

8. A method as claimed in claim 6, wherein a random component is introduced to the learning algorithm to reduce over-training.
9. A method as claimed in claim 8, wherein said random component is a small positive or negative random number.
10. A method as claimed in claim 7, wherein said learning algorithm initially identifies pixels having similar characteristics to a known pixel.
11. A method as claimed in claim 10, wherein similar pixels are searched for within a search radius.
12. A method as claimed in claim 11, wherein said search radius varies for each characteristic.
13. A method as claimed claim 11, wherein the depth of a pixel is determined by a weighted average of distances from similar pixels.
14. A method as claimed in claim 13, wherein weights are inversely proportioned to distance.
15. A method as claimed in claim 6, wherein each characteristic is divided or partitioned into a set of regions and a depth value assigned based on the region which is occupied.

16. A method of creating a depth map including the steps of:
assigning a depth to at least one pixel or portion of an image;
determining x,y coordinates and image characteristics for each said at least one pixel or portion of said image;
utilising said depth(s), image characteristics and respective x,y coordinates to determine a first algorithm to ascertain depth characteristics as a function of x,y coordinates and image characteristics;
utilising said first algorithm to calculate a depth characteristic for each pixel or portion of said image;
wherein said depth characteristics form a depth map for said image.

17. A method as claimed in claim 16, wherein said image characteristics include RGB values.

18. A method as claimed in claim 16 further including the step of reassigning a depth to any pixel or portion of said image to correct for any inconsistencies.

19. A method as claimed in claim 16, wherein said image characteristics include at least one of luminance, chrominance, contrast or spatial measurements.

20. A method as claimed in claim 16, wherein said first algorithm may be represented by the equation:

$$z = f(x,y,R,G,B)$$

where x and y define the relative location of a sample.

21. A method as claimed in claim 16, wherein a learning algorithm is utilised to determine the configuration of said first algorithm.

22. A method as claimed in claim 21, wherein for each pixel in the image, the learning algorithm computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot R_n + k_d \cdot G_n + k_e \cdot B_n$$

where

09333-080901
T06090-2E090660

26

n is the n th pixel in the key-frame image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_a to k_g are constants and are determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

23. A method as claimed in claim 21, wherein a random component is introduced to the learning algorithm to reduce over-training.

24. A method as claimed in claim 23, wherein said random component is a small positive or negative random number.

25. A method as claimed in claim 21, wherein said learning algorithm initially identifies pixels having similar characteristics to a known pixel.

26. A method as claimed in claim 25, wherein similar pixels are searched for within a search radius.

27. A method as claimed in claim 26, wherein said search radius varies for each characteristic.

28. A method as claimed in of claim 25, wherein the depth of a pixel is determined by a weighted average of distances from similar pixels.

29. A method as claimed in claim 28, wherein weights are inversely proportioned to distance.

30. A method as claimed in claim 21, wherein each characteristic is divided or partitioned into a set of regions and a depth value assigned based on the region which is occupied.

FOUO "225360"

31. A method of creating a series of depth maps for an image sequence including the steps of:

receiving a depth map for at least one frame of said image sequence;

utilising said at least one depth map to determine a second configuration of a second algorithm to ascertain the depth characteristics as a function of relative location and image characteristics;

utilising said algorithm to create a depth map for each frame of said image sequence.

32. A method as claimed in claim 31, wherein at least two depth maps corresponding to at least two frames of said image sequence are received.

33. A method as claimed in claim 31, wherein said image characteristics include RGB values.

34. A method as claimed in claim 31, wherein said image characteristics include at least one of luminance, chrominance, contrast or spatial measurements.

35. A method as claimed in claim 31, wherein a learning algorithm is utilised to determine the configuration of said second algorithm.

36. A method as claimed in claim 35, wherein said learning algorithm is one of back propagation algorithm, C4.5 algorithm, or K-means algorithm.

37. A method as claimed in claim 35, wherein said second algorithm computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot R_n + k_d \cdot G_n + k_e \cdot B_n$$

where

n is the n th pixel in the key-frame image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_a to k_e are constants and are determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

38. A method as claimed in claim 31, wherein additional algorithm configurations are created for each pair of frames for which depth maps have been received.

39. A method of creating a series of depth maps for an image sequence including the steps of:

receiving a depth map for at least one frame of said image sequence;

utilising said at least one depth map to determine a second algorithm to ascertain the depth characteristics as a function of x, y coordinates and image characteristics;

utilising said algorithm to create a depth map for each frame of said image sequence.

40. A method as claimed in claim 39, wherein at least two depth maps corresponding to at least two frames of said image sequence are received.

41. A method as claimed in claim 39, wherein said image characteristics include RGB values.

42. A method as claimed in claim 39, wherein said image characteristics include at least one of luminance, chrominance, contrast or spatial measurements.

43. A method as claimed in claim 39, wherein a learning algorithm is utilised to determine the configuration of said second algorithm.

44. A method as claimed in claim 43, wherein said learning algorithm is one of back propagation algorithm, C4.5 algorithm, or K-means algorithm.

09925932.000901
"06080" 2E652660

45. A method as claimed in claim 43, wherein said second algorithm computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot R_n + k_d \cdot G_n + k_e \cdot B_n$$

where

n is the n th pixel in the key-frame image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_s to k_g are constants and are determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

46. A method as claimed in claim 39, wherein additional algorithm configurations are created for each pair of adjacent frames for which depth maps have been received.

47. A method of creating a series of depth maps for an image sequence including the steps of:

receiving depth maps for at least two key frames of said image sequence;

utilising said depth maps to determine a second algorithm to ascertain the

depth characteristics as a function of x,y coordinates and image characteristics;

utilising said algorithm to create a depth map of each frame of said image sequence, wherein frames adjacent said key frames are processed prior to non-adjacent frames.

48. A method as claimed in claim 47, wherein once said adjacent key frame is processed, said adjacent key frame is then considered a key frame for creation of further depth maps.

49. A method as claimed in claim 35, 43, or 47, wherein said second algorithm computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot p_n + k_d \cdot G_n + k_e \cdot B_n + k_f \cdot T$$

where:

n is the n th pixel in the image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_a to k_f are constants previously determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

T is a measurement of time, for this particular frame in the sequence.

50. A method of creating a series of depth maps for an image sequence including the steps of:

selecting at least one key frame from said image sequence;

for each at least one key frame assigning a depth to at least one pixel or portion of each frame;

determining relative location and image characteristics for each said at least one pixel or portion of each said key frame;

utilising said depth(s), image characteristics and respective relative location for each said at least one key frame to determine a first configuration of a first algorithm for each said at least one frame to ascertain depth characteristics as a function of relative location and depth characteristics;

utilising said first algorithm to calculate depth characteristics for each pixel or portion of each said at least one key frame;

wherein said depth characteristics form a depth map for each said at least one key frame.

utilising each depth map to determine a second configuration of a second algorithm to ascertain the depth characteristics for each frame as a function of relative location and image characteristics;

utilising said second algorithm to create respective depth maps for each frame of said image sequence.

51. A method as claimed in claim 50, wherein frames adjacent said key frames are processed prior to non-adjacent frames.

52. A method as claimed in claim 51, wherein following processing adjacent frames are considered as key frames for further processing.

53. A method of encoding a series of frames including transmitting at least one mapping function together with said frames, wherein said mapping function includes an algorithm to ascertain depth characteristics as a function of relative location and image characteristics.

54. A method as claim in claim 53, wherein said image characteristics include RGB values.

55. A method as claimed in claim 53, wherein said image characteristics include at least one of luminance, chrominance, contrast or spatial measurements.

56. A method as claimed in claim 53, wherein a learning algorithm is utilised to determine said mapping function.

57. A method as claimed in claim 56, wherein said learning algorithm is one of back propagation algorithm, C4.5 algorithm, or K-means algorithm.

58. A method as claimed in claim 56, wherein said mapping function computes:

$$z_n = k_a \cdot x_n + k_b \cdot y_n + k_c \cdot R_n + k_d \cdot G_n + k_e \cdot B_n$$

where

n is the n th pixel in the key-frame image

z_n is the value of the depth assigned to the pixel at x_n, y_n

k_a to k_e are constants and are determined by the algorithm

R_n is the value of the Red component of the pixel at x_n, y_n

G_n is the value of the Green component of the pixel at x_n, y_n

B_n is the value of the Blue component of the pixel at x_n, y_n

59. A method as claimed in claim 53, wherein additional algorithms are created for each pair of frames for which depth maps have been received.

[illegible]